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ABSTRACT

In 1988, 59 Kindergarten students were studied to determine the effect of "shadowing" on perceptual-motor learning. Shadowing is a method whereby the use of one's shadow provides visual feedback. The method developed from observing children's natural curiosity in creating shadows. Illuminated by sunlight outdoors or overhead projectors indoors, children standing between a wall and the light source interact with shadows created by themselves, others, or projected images. Shadowing activities are used to develop motor skills and spatial awareness. Students were randomly assigned to one of three groups using a stratified random sampling system. The first group participated in 10 minutes of shadowing tasks, along with 30 minutes of other perceptual motor activities. The second group did the same except for shadowing activities, and the control group received no perceptual activities. On several assessments, the shadowing group scored higher than the other two groups in body awareness, fine motor coordination, gross motor skills, visual motor integration, and depth perception. Females scored higher than males in all three groups. Follow-up studies have reconfirmed the results of the original study. (RB)

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SHADOWING

an Innovative Perceptual-Motor Experience for Young Children

Children, giving in to the demands of their own curiosity, can teach adults many things. Some of the most creative ideas come from children. Unfortunately, to many in the business of mass education, exploring children are a detriment to the planned organization of the class. Every teacher who has shown a film to a class has experienced the distraction of the students who must stick their hands in front of the projector. The students are usually discouraged, by the teacher, from repeating this annoying behavior. The development of the "shadowing" technique for use in perceptual-motor programs would not have been possible, had the children been discouraged from "playing" with shadows in front of the projector. This technique was developed by observing children and encouraging their natural desire to create and explore a world of shadows.

Recent research has shown that young children who participated in shadowing can develop refined perceptual-motor skills. Children who use shadows for visual feedback as they perform gross and fine motor skills, receive immediate reinforcement which enhances their motivation to learn. This technique employs the use of natural sunlight outdoors or overhead projectors indoors. Responding to creative transparencies projected onto a wall, while standing between the light source and the wall, children interact with others, equipment, and the projected images while visually receiving feedback from their shadow.

In a 1988 study, significant improvements were found in perceptual-motor skills of kindergarten students who used the shadowing technique in conjunction with physical education activities. The students who participated in shadowing showed higher scores in body awareness, fine motor coordination, gross motor skills, visual motor integration (VMI), and depth perception than those students in either a developmental physical education class or a control situation with no physical education. The shadowing technique showed the most gains for the "at risk" students over both the developmental program of activities and the control.

Follow-up studies have reconfirmed the findings of the original study. A 1991 study to determine the effectiveness of shadowing in the development of depth-perception in three and four-year-old children found significant improvements for LD pre-school students.

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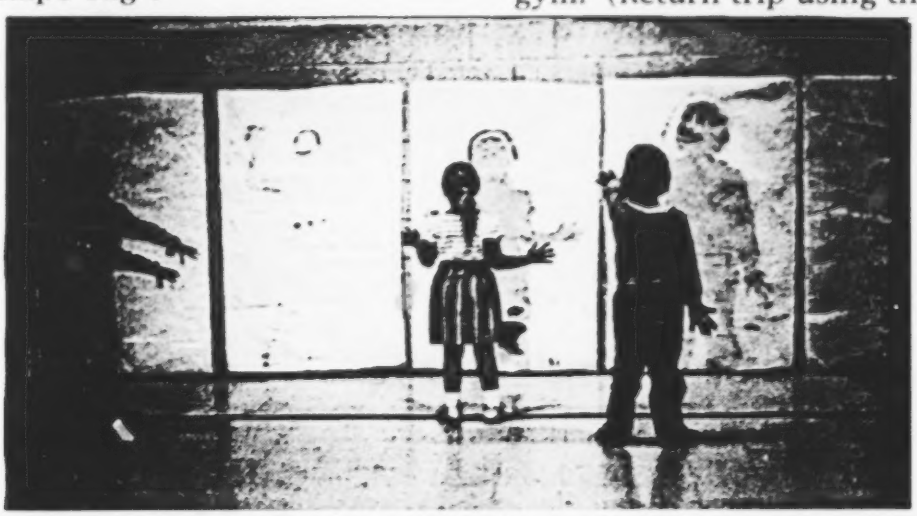
SHADOWING

Shadowing: Using visual feedback provided by one's own shadow to initiate and revise motor responses for perceptual-motor tasks. (Overhead projectors are used indoors as a light source.)

Gross Motor Tasks: Bilateral and crosslateral movement as well as balance are the result as the teacher names shapes, colors and body parts in the game of "Shape Tag".

Fine Motor Tasks: The child develops eye-hand coordination as the "Shadow" balloon is guided through the obstacle course projected onto the wall around the gym. (Return trip using the left hand)



Body Awareness: Each child's shadow had been traced in a previous lesson, then the child colored and added details in the classroom. Light from the overhead projectors enable the student to complete the task of "fitting into" their own pose and the poses of other students.

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SHADOWING STUDY

In 1988, 59 Kindergarten students were studied to determine the effects of Shadowing on perceptual-motor learning. Students were randomly assigned to one of three groups using a stratified random sampling system, thus providing for equality of group means prior to the treatment. One group received a ten minute period of Shadowing tasks in conjunction with 30 minutes of perceptual-motor activities, three times per week for 11 weeks (33 lessons). A second group received a 40 minute period of the same perceptual-motor activities without the shadowing tasks for the same length of time. The third group was the control and received neither treatment.

The students were pre and post tested for 1) body and spatial awareness, 2) gross motor skills, 3) fine motor control, and 4) visual motor integration. The following charts illustrate the effects of each treatment in these areas:

MOTOR ACTIVITY SCALE
POST TREATMENT GROUP MEANS

(Possible Scores: Body Awareness = 13, Fine Motor = 4, Gross Motor = 13)

GROUP	BODY/SPATIAL AWARENESS	FINE MOTOR	GROSS MOTOR
SHADOWING	12.05	3.9	9.75
DEVELOPMENTAL P.E.	11.58	3.79	9.58
CONTROL	11.15	3.75	7.8

TEST OF VISUAL MOTOR INTEGRATION
Perceptual Ages

GROUP	AV. VMI Age (Sept. 1)	AV. VMI Age (Nov. 22)	GAIN
SHADOWING	4 yrs. 9 mos.	5 yrs. 4 mos.	6.7 mos.
DEVELOPMENTAL P.E.	4 yrs. 5 mos.	4 yrs. 11 mos.	6.2 mos.
CONTROL	4 yrs. 9 mos.	5 yrs. 1 mos.	5.2 mos.

SUMMARY OF THE EFFECTS OF SHADOWING

Based on the limitations of this study the program of developmental physical education with the shadowing technique resulted in the following conclusions:

1. Shadowing was found to be statistically significant in the development of perceptual-motor learning for kindergarten students.

2. Shadowing resulted in higher scores on Area I of the Motor Activity Scale, measuring body imagery and spatial awareness.

3. Shadowing resulted in higher scores on Area II of the Motor Activity Scale, measuring fine motor control.

4. Shadowing resulted in higher scores on Area III of the Motor Activity Scale, measuring gross motor development. Gross motor scores measured the largest difference between groups.

5. Shadowing resulted in higher scores across the treatment groups for both high and low risk students, with the greatest differences being at the high risk level.

6. Shadowing resulted in higher increases between pre- and post-test VMI scores.

7. The shadowing group had the largest percentage of above average and perfect scores on the depth perception portion of the Telebinocular test, with the lowest average age for students achieving at this level.

8. Females in the shadowing group scored slightly higher than the males in the shadowing group, and higher than the males in the other two treatment groups.

DEPTH PERCEPTION

As in many studies, an unexpected discovery was made. All subjects in the study were pre-tested for visual ability using the monocular Snellen test. About seven weeks into the study, one of the students in the shadowing group was tested by the "family optician" and given a telebinocular test for vision. The report showed very high scores in all areas of the test for depth perception.

Since depth perception is a learned skill and is not often fully acquired before age eight or nine, I began wondering if more students in the shadowing group would test above average in depth perception. The students had not been pre-tested for depth perception, but the following

chart shows the post treatment results. (70% of the Shadowing group scored above average on depth perception and had a lower mean age than those scoring above average in the other two groups.)

1988 DEPTH PERCEPTION FINDINGS

GROUP	Av. Age	N Above Av.	Percent	N Perfect Scores	Percent
SHADOWING	5.57	14	70.0%	8	40.0%
DEVELOPMENTAL P.E.	5.86	10	52.6%	3	15.8%
CONTROL	5.79	11	55.0%	4	20.0%

In a 1989 follow-up study, 132 Kindergarten students representing eight different classes were given the depth perception portion of the Telebinocular at the end of the school year. In the same school (see School ID: R in the chart below), the morning class which had received the shadowing treatment only one time per week for 18 weeks showed over 76% of the students received a perfect score for depth perception, whereas only 16.66% of the students in the afternoon program (without Shadowing) scored as well.

TIME	SCHOOL ID	N	CA (6/89)	TRTMT	DP=12	DP=AA
PM	GR/T	16	5-3	S	41.17%	82.35%
AM	GR	14	5-3	S	31.50%	63.15%
AM	R	18	5-4	S	76.19%	90.47%
PM	R	17	5-5	GAMES	16.66%	52.63%
PM	GR	16	5-4	P-M	28.00%	61.90%
AM	PH	14	5-3	GAMES	14.28%	64.28%
PM	K	20	5-3	GAMES	5%	30.00%
AM	I	17	5-2	GAMES	0%	0%

Interpretation of the above chart:

TIME: The Kindergarten classes in the Edison Local School District are all on a half-day schedule of 2 1/2 - 3 hours.

N: Signifies the number of students who were tested.

CA: Represents the group means in years and months as of June 1989

TRTMT: signifies the type of physical education treatment program the group received between the pre and post tests.

S = a perceptual-motor program which incorporates the SHADOWING technique.

G = the traditional program of low organized games.

P-M = a developmental program of perceptual-motor activities.

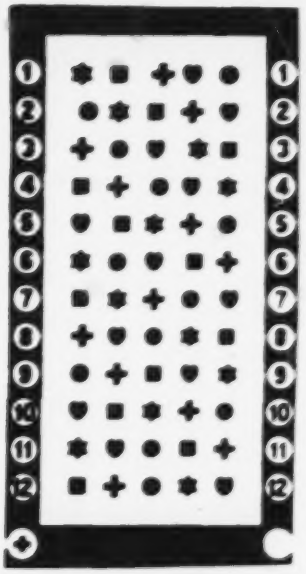
DP = 12: indicates the percent of children in the class who scored a perfect 12 points on the depth-perception portion if the Telebinocular.

DP = AA: indicated the percent of children in the class who scored above average (8 or more correct out of 12) on the depth-perception portion of the telebinocular.

Follow-up studies have reconfirmed the findings of the original study. A 1991 study to determine the effectiveness of shadowing in the development of depth-perception in three and four-year-old children found significant improvements for LD pre-school students.

KEYSTONE TELEBINOCULAR

The Telebinocular permits both eyes to be evaluated as they work together. The student sits and places his/her forehead against the machine looking straight ahead into the binocular eyepieces. The visual illustrations are provided on specially designed cards, placed behind the machine on an adjustable carrier and are electrically lighted within the machine itself. The adjustable carrier moves the pictures toward and away from the binoculars for both near and far point testing. This test of binocular visual efficiency locates problems of vision that would escape monocular testing.



DEPTH PERCEPTION 12 ITEM CHART

The tests for steropsis include 12 rows of items, each having one item appear to "stand-out" from the others in the row. Row items include commonly recognizable shapes such as a square, circle, cross, star, or heart. The student is asked "Which symbol stands out in each of the next lines?" Correct responses are marked on the student's individual score sheet. Each row increases in difficulty due to a progressive decrease in the distance from which the selected shape stands out from the others.

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METROPOLITAN READINESS TEST
KINDERGARTEN MAY 1989

The original group of 59 Kindergarten students was followed for progress throughout the school year. A comparison of the scores on the Metropolitan Readiness Test was calculated by treatment groups.

METROPOLITAN READINESS TEST
Percentile Rank averages

GROUP	AUDITORY	VISUAL	LANGUAGE	QUANTITATIVE	READING
SHADOWING	64.4	60	60.3	56.5	65.8
CONTROL	55.9	46.3	52.8	48.3	49.9
DEVELOPMENTAL P.E.	42.3	43.7	54.7	40.3	46.3

The control group, which scored lowest on all phases of the tests used in the study (Motor Activity Scale, Visual Motor Integration, and Telebinocular), has now moved into second place on all of the readiness tests (except for language). The developmental physical education group scored lowest on 4 of the 5 tests shown above.

I do not know if there is a relationship, but the developmental physical education group was the only group which did <u>not</u> participate in shadowing activities during the school year. The control group was given the developmental physical education program <u>with</u> shadowing after the study was completed until the end of the shcool year. However, the control group only had physical education once a week from December until June.

Whether directly or indirectly, perceptual-motor ability is critical to early success in school. In order to acquire an increase in perceptual-motor ability, the student must be provided with planned learning experiences. If the sensory modality of vision and visual perception can increase perceptual-motor learning for children, then shadowing as a learning tool could serve to enhance the curriculum. The natural tendency to create shadows in light and observe the effects is very stimulating and rewarding to children. The original study, as well as two follow-up studies have found shadowing to have a significant educational value. Therefore, early learning specialists should begin to develop and expand the concept.

SHAPE TAG

LESSON THEME: "Colors and Shapes"

GENERAL OBJECTIVES

To develop visual perception and integration with cognitive abilities.

To develop an understanding of the concept of directionality.

To develop coordinated lateral, bi-lateral, and cross lateral body movements.

To develop spatial awareness.

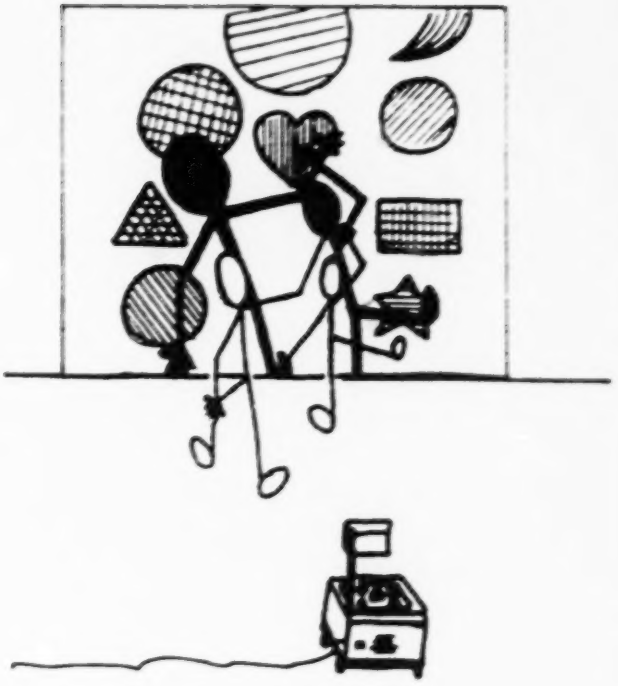
To develop static and dynamic balance.

SENSORY MODALITIES

Visual, auditory, kinesthetic

TIME: 15 min. SHADOWING: "Color and Shape Tag"; Overhead transparencies prepared with various size and color shapes (circle, square, and triangle) are projected on the wall, between partners. The partners stand towards the outside edge of the light source, one on the right (using left hand), and the other on the left (using the right hand). The teacher calls out a shape, a color, or a combination. The students attempt to tag the named shape quicker than the partner. After several calls, the partners trade sides. After several more calls, students get new partners and the game is continued.

This game may become more complex by playing it as you would the floor game of "Twister". Give verbal cues such as "Put your right hand on the heart". Then without moving the right hand "Put your left hand on something green".....then..... "Put your left foot in a square.", etc.



Please Note: Shadowing activities should be conducted in conjunction with other planned perceptual-motor activities. Shadowing is not a substitute for a program of motor skills, but rather a way to enhance learning. A program of lessons which incorporates Shadowing with traditional activities is currently being readied for publication. For more information or presentations on this topic please contact:

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